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RUSSIAN SCHOOL OF TRANSDISCIPLINARITY AS A METADISCIPLINE

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РОССИЙСКАЯ ШКОЛА ТРАНСДИСЦИПЛИНАРНОСТИ КАК МЕТАДИСЦИПЛИНА

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ABSTRACT

Over the past 50 years, scholars have conceived transdisciplinarity as a methodology, a practice, and a theory. This paper shares the Russian school of transdisciplinarity, which, starting in 1990, created *systems transdisciplinarity* and framed it as a new metadiscipline with its own meta-theory and meta-narrative. The intent is to train students in a systems transdisciplinarity worldview and mindset. Graduates would be called *specialist systems transdisciplinarity generalists.* Proponents drew on the Greek Philosopher Plotinus (focused on the One). The discipline's main architect, Russian engineer and philosopher Dr. Vladimir Mokiy, created the Unicentrism philosophy and formulated a collection of relevant axioms and constructs: isomorphism, One Orderly Medium, General order, units of General order, potency, prospective futurity, space, information, time, unification, generalization, and functional ensembles. The methodologies developed for this approach have been empirically validated. People educated in this metadiscipline would partake in specially designed university departments that deliver specially designed higher education curricula and methodologies. Because this metadiscipline is intended for integration into any university's organizational structure, the paper concludes with evidence supporting the proponents' assertion that systems transdisciplinarity meets the criteria of an academic discipline.

АННОТАЦИЯ

За последние 50 лет ученые рассматривали трансдисциплинарность как теорию, методологию и практику. В этой статье рассказывается о Российской школе трансдисциплинарности, которая, начиная с 1990 года, создала системную трансдисциплинарность и оформила ее как новую метадисциплину со своей собственной метатеорией и метанарративом. Цель этой метадисциплины состоит в том, чтобы обучить студентов системному трансдисципли-нарному мировоззрению и мышлению. Выпускников можно было бы назвать системными трансдисциплинарными генералистами (специалистами широкого профиля). Сторонники системной трансдисциплинарности опирались на античного философа Плотина (сосредоточились на Едином). Главный архитектор дисциплины, российский инженер и философ доктор Владимир Мокий, создал философию Единоцентризма и сформулировал набор соответствующих аксиом и конструкций: изоморфизм, единая упорядоченная среда, всеобщий порядок, единицы всеобщего порядка, потенция, предполагаемое будущее, пространство, информация, время, унификация, обобщение и функциональные ансамбли. Методологии, разработанные для этого подхода, были эмпирически подтверждены. Предполагается, что студенты будут обучаться этой метадисциплине на специально созданных университетских кафедрах по специально разработанным учебным программам и методикам высшего образования. Поскольку эта метадисциплина предназначена для интеграции в организационную структуру любого университета, статья завершается доказательствами, подтверждающими утверждениями о том, что системная трансдисципли-нарность соответствует критериям академической дисциплины.

Keywords: transdisciplinarity, systems transdisciplinarity, Unicentrism, metadiscipline, higher education

Ключевые слова: трансдисциплинарность, системная трансдисциплинарность, Единоцентризм, метадис-циплина, высшее образование

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Introduction

The Russian school of transdisciplinarity (called *systems transdisciplinarity*) began in 1990 through the aegis of several Russian higher education institutions, nonstate scientific institutions, and independent laboratories (Institute of Transdisciplinary Technologies [ITT], 2023a; Mokiy & Lukyanova, 2022c). Because the *Russian school* is not an actual school, the ITT was established in 2007 to preserve, generalize, and further develop the systems transdisciplinarity experience.

Over the last 34 years, systems transdisciplinarity has solidified into a well-established approach within the Russian context and is self-promoted as achieving "significant theoretical, methodological, and technological results" (Mokiy & Lukyanova, 2022d, p. 149). To better ensure international exposure, proponents (namely Drs. Vladimir Mokiy and Tatiana Lukyanova) have intentionally published nearly 20 English-language refereed articles since 2019 (Mokiy, 2023a).

Proponents of the approach to transdisciplinarity evolving in Russia framed systems transdisciplinarity as a new academic *discipline* (ITT, 2023a; Mokiy, 2020b; Mokiy & Lukyanova, 2022b), which differs from Nicolescu's *methodology*, the Zurich (German/Swiss) school's pragmatic *approach* of doing science with society, and the Brazilian *theory* of transdisciplinarity (TD) (McGregor, 2023). An academic discipline is a branch of knowledge or field of study that is taught and researched as part of higher education. Disciplines vary between being (a) well established and widely taught and practiced and (b) recently established with limited presence and support (Kirshnan, 2009). Right now, the systems transdisciplinarity discipline fits the latter profile but with great ambitions. This article profiles its development process, basic philosophical and methodological tenets, and its fit with the six characteristics of an established academic discipline.

Systems Transdisciplinarity's Three-Stage Development Process

Systems transdisciplinarity was developed in three stages over the course of 30 years: (a) created a metadiscipline and supportive philosophy (early nineties), (b) developed a methodology (mid-nineties onward) and (c) tested empirically (2000s onward) (ITT, 2023a). In 2017, a university-level textbook was published titled *Metodologiya nauchnykh issledovaniy: Transdistsiplinarnyye podkhody* (*Methodology of scientific research: Transdisciplinary approaches*). It is now in its second edition (Mokiy & Lukyanova, 2021) with another textbook in progress (Mokiy, 2022; Mokiy & Lukyanova, 2023).

Create Metadiscipline and Supportive Philosophy

In the early nineties, systems transdisciplinarity was conceived as a specific scientific and academic discipline (metadiscipline) so named because it combines systems thinking with the transdisciplinary worldview. But it eschewed the traditional system-theory concepts of subsystems and supersystems (i.e., containers of subsystems) because they presuppose the existence

of suborders and force researchers to look for order in order (Mokiy & Lukyanova, 2022d). Thus, to create the systems transdisciplinarity discipline, it was necessary to clarify the generic definition of transdisciplinarity, separate transdisciplinarity from systems transdisciplinarity, and introduce the General order Unicentric philosophy and transdisciplinary system construct (Mokiy & Lukyanova, 2022c).

Regarding the latter, the new discipline is based on the specially developed Unicentrism philosophy (to be discussed), a term Mokiy coined 20 years into the development process (around 2010) (Mokiy, 2019c, 2022d). The systems transdisciplinarity discipline is not concerned with *holism*, which views the world in terms of interacting wholes that are more than the sum of their *parts*. Rather than a philosophy of wholeness, systems transdisciplinarity is concerned with a philosophy of isomorphism, which is the similarity of processes or the structure of one entity to those of another. Things may have different origins, *but* they end up being similar because they do some things "the same way" (isomorphic). This similarity can result from imitation or independent development under similar conditions and constraints (DiMaggio & Powell, 1983).

Unicentrism views the world as having one single center of origin (i.e., one-centeredness) or a *General order* (*essence*) that is reflected and displayed in all *fragments* of that world (*units of order*) via isomorphisms (Mokiy, 2020b). Systems transdisciplinarity thus eschews hierarchism – a ranking system that is ordered according to status, importance, or authority – in favour of a universal General order (i.e., an essence that imbues everything). No one unit is more important than another. Instead, each unit (fragment) contains aspects of the General order. The latter permeate everything and can do so because of isomorphism (i.e., being identical or similar in form, shape, structure, processes, or relations).

Develop Methodology

Second, once the approach was philosophically and theoretically sound (tenets to be discussed), a methodology was developed (starting around the mid-nineties) that is based on a *systems transdisciplinarity* model of General order and involves the unification and generalization of disciplinary knowledge (Mokiy & Lukyanova, 2022a). This methodology (to be discussed) focuses on the development and usage of transdisciplinary models of three units of order: spatial (existence), informational (manifestation) and temporal (transformation) (ITT, 2023a). Units of order (fragments imbued with the essence of General order) are "logically complete structures of space fragments, attributes information and time periods of the transdisciplinary system model" (ITT, 2023b, Unit of Order section). Mokiy and Lukyanova (2022d) further explained that the model of the spatial unit of order provides grounds for the physical or logical object boundaries and the nature of relations between elements within these boundaries. The model of the informational unit of order provides grounds for the necessary and sufficient amount of information on the object. The model of the temporal unit of order shows the organization that converts

the internal potency of the object from the original volume to the results that will be used in the subsequent processes of its conversion (p. 150).

Test Empirically

Third, from 2000 onward, the systems transdisciplinarity methodology has been empirically tested for solving complex multifactorial problems in various fields of science and practice (ITT, 2023a, 2024). Many *other* academic disciplines were involved in this process: biology, education, physics, engineering, management, economics, and sociology. Quantitative, empirical experiments have proved "there is a universally applicable, theoretically predicted and practically proven natural regularity [, which, when applied,] gives a variety of new methodologies and technologies for regulation of [the] state of natural and social processes and harmonization of this state" (ITT, 2023a, para. 6; Mokiy & Lukyanova, 2023). Harmonization is desired "between people and States, between natural and artificial ecosystems, and between different ideologies and religions" (Mokiy, 2020a, p. 27).

Research has further confirmed that relevance, reliability, scientific severity, and efficiency of the disciplinary tools and methods used for the process of systems transdisciplinarity research are retained (Mokiy & Lukyanova, 2022c). In other words, results from research conducted using this methodology are consistently reliable (can be replicated), valid (measured what was intended), and generalizable beyond the sample frame.

Rationale for a New Discipline

To reiterate, those responsible for its formulation considered systems transdisciplinarity a new academic discipline (not a philosophy, methodology, theory, model, or practice). For them, this discipline is suitable for "any specialist and scientist of any nationality and citizenship [who] views transdisciplinarity as a separate scientific discipline [and an independent science]" (ITT, 2023a, para. 1; Mokiy & Lukyanova, 2023). Proponents strategically framed systems transdisciplinarity as a standalone discipline so they could argue for its integration "into existing classifications of scientific directions and scientific approaches [and] organically integrate [it] into the educational process of universities" (Mokiy, 2020b, paras. 12, 13).

Proponents presumed that universities should have specific departments that train transdisciplinary experts to solve "complicated [wicked] high-threshold problems [in concert with] disciplinary specialists and transdisciplinary researchers from all concerned countries" (Mokiy & Lukyanova, 2022b, p. 19). They thus defined transdisciplinarity as "a way of intensifying intellectual activity in the field of interdisciplinary interactions, contributing to the maximum extension of the scientific worldview horizon" (Mokiy & Lukyanova, 2022b, p. 19). This requires not limiting oneself to the framework of any scientific discipline when examining a particular phenomenon (Mokiy, 2009). With an expanded worldview shored up by a systems transdisciplinarity mindset,

people can more effectively engage high-threshold, multifactorial phenomena (i.e., wicked problems) such as the global socioeconomic order, sustainable development, climate change, viral pandemics, and natural disasters (Mokiy & Lukyanova, 2022b).

Metadiscipline

Drawing on Judge's (1994) classification of five forms of transdisciplinarity (Form 0–4), proponents of systems transdisciplinarity viewed it as a *metadiscipline* not just a discipline (Mokiy, 2019a). By way of comparison, Transdisciplinarity-0 depends on people using metaphors as rhetorical and illustrative purposes to temporarily bridge seemingly incommensurable domains, so people have a context for a new experience (Judge, 1994). Transdisciplinarity-1 is "based on the formal interconnection of scientific monodisciplines [that] demonstrate tolerance and trust in each other's knowledge in solving a complex problem" (Mokiy, 2019a, p. 75; see Judge, 1994). Transdisciplinarity-2 is based on traditional disciplines presuming that studying "the physical essence of the object, without examination of its mental (spiritual) development, does not provide a complete picture" (Mokiy, 2019a, p. 75). Therefore, disciplines engage in praxis that leads to an "experiential knowledge base or way of seeing the world" (Judge, 1994, Forms of Transdisciplinarity section). Transdisciplinarity-3 is based on using metaphors as a "cognitive framework" to teach, learn about, see, and relate to the world with the most powerful metaphor being systems thinking (Judge, 1994; Mokiy, 2019a). Transdisciplinarity-3, as a knowledge-creation mechanism is different from the TD-0 form, which accommodates using metaphors as a bridging mechanism. The Russian school accordingly viewed systems transdisciplinarity as an evolution beyond other types of transdisciplinarity (e.g., a methodology, practice, and theory) and established it as "an independent scientific discipline (metadiscipline) that supports the generalization of disciplinary knowledge" (Mokiy, 2019a, p. 76). Framing it as a metadiscipline "endows the potential of systems thinking and transdisciplinarity with all the elements of scientific rigor" (Mokiy & Lukyanova, 2022b, p. 21).

Metadisciplines are accommodated in Transdisciplinarity-4, which deals with transformation. TD-4 especially "permits the transdisciplinary frame-work *itself* [emphasis added] to undergo transformation in order to evolve" (Judge, 1994, Forms of Transdisciplinarity section). The Russian school accordingly viewed systems transdisciplinarity as an evolution beyond other types of transdisciplinarity (e.g., a methodology, practice, and theory) and established it as "an independent scientific discipline (metadiscipline) that supports the generalization of disciplinary knowledge" (Mokiy, 2019a, p. 76). Framing it as a metadiscipline "endows the potential of systems thinking and transdisciplinarity with all the elements of scientific rigor" (Mokiy & Lukyanova, 2022b, p. 21).

A metadiscipline is "an integrated effort that removes traditional barriers between [disciplines] and focuses

instead on innovation and the applied process of designing solutions to complex contextual problems" (Kennedy & Odell, 2023, Abstract). Indeed, "the [systems transdisciplinarity] meta-discipline has all the requirements that allow it to be ... used in the higher education system and for the solution of complex multifactorial problems of nature and society" (Mokiy, 2019a, p. 76). As a metadiscipline, systems transdisciplinarity "shelters under its capacious wings domains of insight, vision, knowledge, horizons of meaning, and worldviews discarded by the march of Progress, but still vibrant, even vital, in their energy, creativity, imaginative reach, and inspiration" (Keenan, 2020, para. 8).

Meta-Theory

Meta is a Greek word-forming element that means overarching (all embracing) or a higher order (Harper, 2024). As a metadiscipline, systems transdisciplinarity helps people to understand the world via a meta-theory, and a meta-narrative (Mokiy & Lukyanova, 2022b). A meta-theory (theory about theory) is usually defined as a concern for "the investigation, analysis, and description of theory itself" (Bates, 2005, p. 1). Bates (2005) further posited that metatheory is actually "the philosophy behind the theory, the fundamental set of ideas about how phenomena of interest in a particular field should be thought about and researched" (p. 2).

Using that framing, the systems transdisciplinarity meta-theory concerns "the general representation of the fundamental features of the world order and the forms of their manifestation" (Mokiy & Lukyanova, 2022b, p. 21). The purpose of this meta-theory is to "create a picture of the one and only world" (Mokiy, 2020b, para. 4) using unified and generalized results from studies about fragments of that world (to be discussed).

To elaborate, disciplines (with their own worldviews) are considered local pictures – abstract models – of certain fragments of the One and Only World. Systems transdisciplinarity's meta-theory interprets the results of research efforts to model these fragments, so researchers can eventually build a picture of the One and Only World. This meta-theory thus "appears to be a scheme that defines the way and context of building scientific models of the researched areas (fragments)

of reality" (Mokiy, 2020b, para. 4). This requires researchers using certain intellectual processing skills including rethinking, ordering, and generalization (Mokiy & Lukyanova, 2022d).

Meta-Narrative

Proponents of this new approach to transdisciplinarity appreciated the need for effective messaging about its intent – a focus on the One World – and research outcomes. They needed a narrative (i.e., a commentary – an account of connected events) or better yet a meta-narrative, which is a narrative about narratives (Appignanesi & Garratt, 1995). While the systems transdisciplinarity meta-theory paints a picture of the One World, its meta-narrative tells the story of that World. It helps users tell others (narrate) what the metadiscipline is about. This meta-narrative comprises "a universal system of signs, symbols, notions, and models used to create a single type of description of objects and the presentation of interrelated events in the picture of the one and only world" (Mokiy, 2020b, para. 5).

In its *meta* role (i.e., overarching and all encompassing), the systems transdisciplinarity meta-narrative "summarizes the knowledge and languages of scientific disciplines, as well as [their] cultural and semantic discourses (areas of interaction)" (Mokiy & Lukyanova, 2022d, pp. 149–150). This meta-narrative "is formed from [researchers engaging in] a process of philosophical rethinking of general concepts and categories (space, time, information, systems), which are necessary and sufficient to describe the picture of the one and only world" (Mokiy & Lukyanova, 2022b, p. 21).

The resultant systems transdisciplinarity meta-narrative is articulated or narrated using Unicentrism's philosophic axioms and principles specially created for this new metadiscipline: isomorphisms, One Orderly Medium (the One and Only World), General order (universal essence), units of order (fragments containing the essence), potency, prospective futurity, space (existence), information (manifestation), time (transformation), unification of disciplinary knowledge, generalization into systems transdisciplinarity knowledge, and functional ensembles (Mokiy & Lukyanova, 2022d) (see Figure 1).
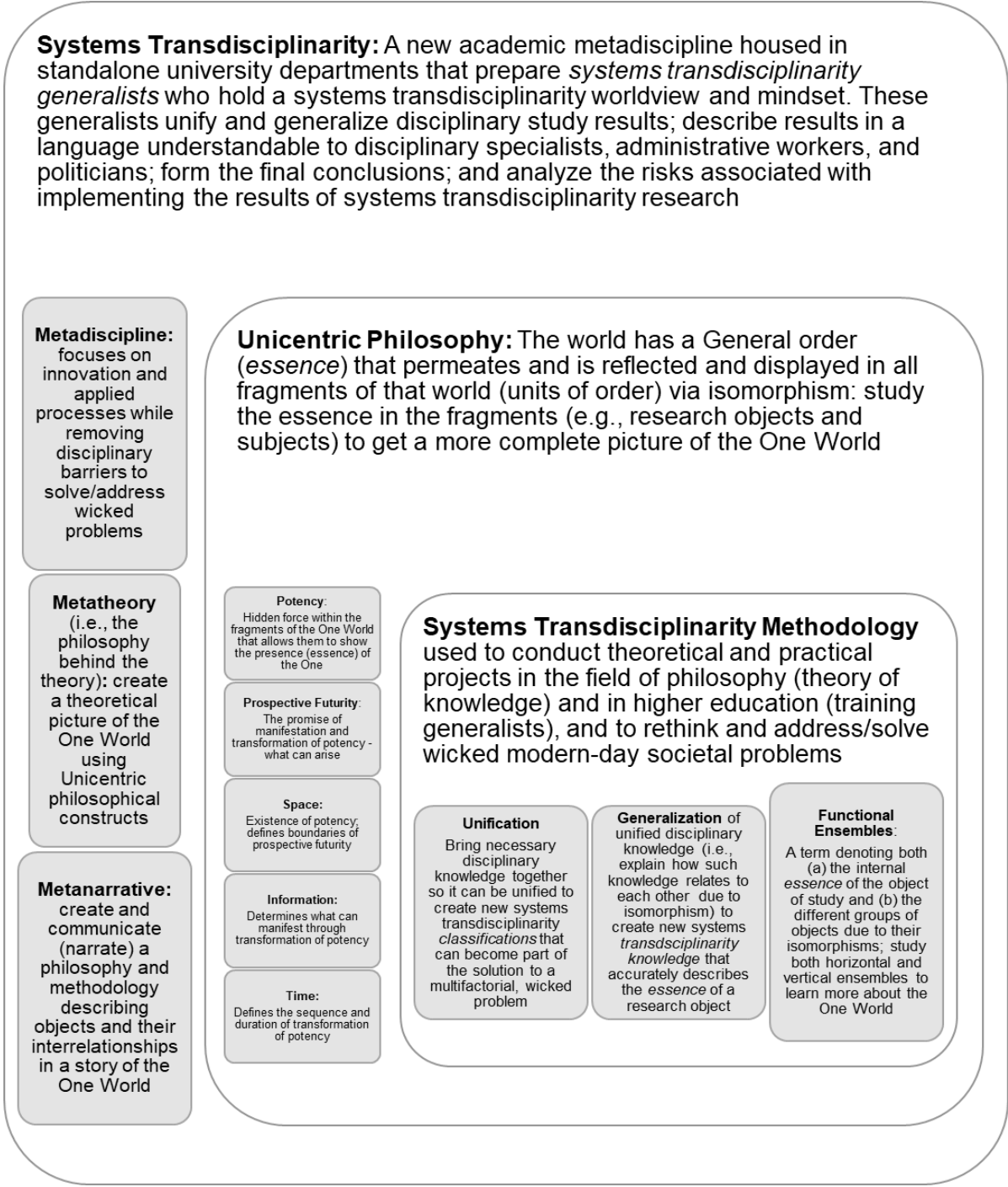
Systems Transdisciplinarity: A new academic metadiscipline housed in standalone university departments that prepare *systems transdisciplinarity generalists* who hold a systems transdisciplinarity worldview and mindset. These generalists unify and generalize disciplinary study results; describe results in a language understandable to disciplinary specialists, administrative workers, and politicians; form the final conclusions; and analyze the risks associated with implementing the results of systems transdisciplinarity research

Metadiscipline: focuses on innovation and applied processes while removing disciplinary barriers to solve/address wicked problems

Unicentric Philosophy: The world has a General order (*essence*) that permeates and is reflected and displayed in all fragments of that world (units of order) via isomorphism: study the essence in the fragments (e.g., research objects and subjects) to get a more complete picture of the One World

Metatheory (i.e., the philosophy behind the theory)**:** create a theoretical picture of the One World using Unicentric philosophical constructs

Potency: Hidden force within the fragments of the One World that allows them to show the presence (essence) of the One

Prospective Futurity: The promise of manifestation and transformation of potency - what can arise

Systems Transdisciplinarity Methodology used to conduct theoretical and practical projects in the field of philosophy (theory of knowledge) and in higher education (training generalists), and to rethink and address/solve wicked modern-day societal problems

Space: Existence of potency; defines boundaries of prospective futurity

Metanarrative: create and communicate (narrate) a philosophy and methodology describing objects and their interrelationships in a story of the One World

Information: Determines what can manifest through transformation of potency

Time: Defines the sequence and duration of transformation of potency

Unification Bring necessary disciplinary knowledge together so it can be unified to create new systems transdisciplinarity *classifications* that can become part of the solution to a multifactorial, wicked problem

Generalization of unified disciplinary knowledge (i.e., explain how such knowledge relates to each other due to isomorphism) to create new systems *transdsciplinarity knowledge* that accurately describes the *essence* of a research object

Functional Ensembles: A term denoting both (a) the internal *essence* of the object of study and (b) the different groups of objects due to their isomorphisms; study both horizontal and vertical ensembles to learn more about the One World

Figure 1. Main Components of the Russian Systems Transdisciplinarity Metadiscipline

Philosophical and Methodological Tenets of Systems Transdisciplinarity

Proponents reasoned that to count as a discipline (i.e., an independent science), which can be established within the university system, systems transdisciplinarity must have philosophical substantiation, theoretical concepts, methods for conducting transdisciplinary science, and technological solutions (Mokiy & Lukyanova, 2022b). This section addresses these elements.

Unicentrism Philosophical Axioms

To begin, the systems transdisciplinarity metadiscipline is concerned with "the united world [which] is the one and only world. Any objects at all levels of the reality of the one and only world are its natural elements and fragments. Therefore, the main condition for the existence of the one and only world is the existence of a universal order in it" (Mokiy, 2019b, p. 61; Mokiy & Lukyanova, 2022d). This General order permeates and defines everything. This conceptualization of transdisciplinarity is possible because, in their development of systems transdisciplinarity, the Russian school drew on the Greek philosopher Plotinus instead of Aristotle (Mokiy, 2011).

Aristotle was concerned with "the God," while Plotinus was concerned with "the One" (Rist, 1973, p. 75). Aristotle dealt with dualism (subject and object) and holism (the whole is more than the sum of its parts). Objects can

be separate from the whole, which means these *parts* can be (even should be) studied using different methodologies and methods (Mokiy, 2011). Plotinus dealt with oneness and believed that "the one world has no parts. [Instead, all] objects can [only ever] be its natural *fragments* [that] represent the same World" (Mokiy, 2011, p. 15). Each fragment of the One contains the essence of the One. Researchers study the former to gain a more complete picture (theory) and story (narrative) of the latter.

For this reason, all fragments (research objects) can be studied using one methodology based on the principle of unity or unicentrism (Mokiy, 2011, p. 15). The Russian school called that methodology *systems transdisciplinarity*, which is intended to be taught in the metadiscipline of the same name grounded in the Unicentrism philosophy, which Vladimir Mokiy developed (Mokiy, 2022 c). Plotinus suggested that when a system is considered to be the One order, the world cannot be divided into parts. Instead, it presents its *essence* in a combination of its own *fragments*. When conducting research, people should thus "cognize the essence while searching [for the unity in each fragment]" (Mokiy, 2011, p. 20).

Unicentrism comprises four philosophical axioms informed by Plotinus' musings, which gives this approach to transdisciplinarity a totally unique and different flavour compared to the dominant transdisciplinary schools (i.e., Nicolescuian, Zurich, and Brazilian). Axioms are self-evidently true propositions – no proof required:

• The world is One Orderly Medium [the One and Only world];

• The unity of the One Orderly Medium determines the General order;

• General order is associated with a transdisciplinary system; and

• Models of the transdisciplinary system, manifested in space, time, and information, allow understanding, know, and describe the world in its unity at any level of reality (Mokiy & Lukyanova, 2022a, p. 22).

The first axiom presumes that General order manifests itself everywhere – in every fragment and their interactions; it is universal. Despite being independent, each object (i.e., each unique orderly medium) has features that make it a fragment of the One Orderly Medium. Evidence of the One and Only World is in every object, every interrelation, and every interaction. The intent of systems transdisciplinarity is to search for evidence of the One and Only World in each of its objects or fragments. Thus, when engaged in systems transdisciplinary work, people are not only exploring an individual fragment but also its interactions and connections to gain a better "understanding of its true location and function in the world" (ITT, 2023c, Section 5; Mokiy & Lukyanova, 2022b).

Potency

Instead of looking at phenomena as objects to be described, systems transdisciplinarity describes phenomena in terms of how they come to be, which inti-mates a future overtone (Mokiy, 2011, inspired by Laszlo, 1995, Part Five). A key feature of Unicentrism is thus *potency* (from Latin *potential* 'force') (e.g., what can

arise) (Harper, 2024). Plotinus described potency as "a *hidden force* – the all omnipotent force of the One" (Mokiy, 2011, p. 23). Because potency also means what can arise, the Russian school further connected it to the *prospective futurity* of the One and Only World (and ultimately the material world) (Mokiy & Lukyanova, 2022e).

To unpack this, prospective means expected or likely to happen or to be in the future. But future and futurity are not the same. The future, from Latin *futurus* 'going to be' (Harper, 2024), is "an eventual fixed event" (Álvarez, 2020, p. 9). In contrast, futurity is a vision of the future, "a forward-driven mode ... an image and a horizon: seen and discussed but just out of reach" (Álvarez, 2020, p. 9). Futurity thus "always retains the essential structure of a promise" (Black & Álvarez, 2020, p. 4) (i.e., an assurance that something will happen; a good reason to expect something in the future). In effect, potency is the promise of futurity (ITT, 2023 b).

Potency (the hidden, latent force – the promise that it will manifest, which may require transformation) "determines the physical and logical boundaries of the world; the ability to manifest (inform about yourself) and transform (achieve goals in appropriate processes)" (Mokiy, 2020a, p. 28). To reiterate, the intent of systems transdisciplinarity is to describe phenomena in terms of futurity – a vision (promise) of future existence (Mokiy, 2020b). de Armas enticingly suggested that "by reversing the projection of futurities, we may discern new [interpretations] of older [fragments], moments where they echo their future and burst into later times as they seemingly challenge a linear [hierarchal] historicity" (2020, p. 65).

As noted, potency also pertains to each unique fragment's inner organization that enables it to show the presence of the One Orderly Medium within. The latter comprises fundamental fragments that are successively recognizable in each other: (a) Nothing (i.e., an independent stable state from which potency is engendered; Nothing is the absence of the initial state of potency – the absence of futurity); (b) the First Absolutely Simple Beginning that precedes the potency of things (i.e., hidden possibilities of what can arise – the *prospective futurity* of the world); (c) the Noumenal World (i.e., things people seem compelled to believe in but can never know due to lack of sense-evidence of them); and (d) the Material World (i.e., the real, physical world that exists independently of human consciousness) (ITT, 2023b; Mokiy, 2011). "Knowing and understanding the material world through the prism of Unicentrism, it becomes possible to reasonably describe a *promising* future in which there is a place for humanity and the results of its development. It is the knowledge of the results of a promising future that allows us to talk about the possibility of managing multifactorial problems" (Vladimir Mokiy, personal communication, October 3, 2023).

Space (Existence), Information (Manifestation), and Time (Transformation) of Potency

Systems transdisciplinarity potency adopts its own understanding of the conventional philosophical notions

of space, information, and time. Space is existence, information is manifestation, and time is the transformation *of potency*. Potency is the crux of everything in the Russian transdisciplinary approach. Normal scientific, psychological, sociological, and cultural definitions and conceptualizations of space, information, and time do *not* concern potency. Potency (the hidden, latent force of the One) deals with each object's inner organization that enables it to show the presence of the General order within (ITT, 2023c; Mokiy, 2020a, 2020b). Space (existence), information (manifestation), and time (transformation) are crucial to this revelation.

To elaborate, space is not a place where events unfold as measured by linear time (e.g., clocks or calendars). Instead, in the Unicentric philosophy, space is a form through which a prospective futurity has both reference and real meaning. Unicentric space comprises four fragments (i.e., (a) etalon [reference state] information and (b) real information of a quantitative and qualitative type) that determine the *existence* of potency – the ability to arise. Quantitative type information describes an object's subject matter. Qualitative type information describes its properties and functions. Fragments of space are viewed as "an invisible organizing force [that] determines the nature of the processes occurring in them. This organizing force is embodied in the General order, which in turn determines the unity of the material world" (Mokiy, 2020a, p. 19).

Information is more than content gained from processing and reacting to the outside world. Instead, in the Unicentric philosophy, information is a form through which a prospective futurity acquires the essence of all possible objects and their interactions. Information comprises the types and attributes of *complete* information related to (a) space fragments and (b) time as they both inform the *manifestation* of potency. Information of this nature makes it possible to discover that space comprises a state of potency (a) that plays the role of homeostasis of the development of objects of the material world (i.e., Nothing) and (b) that objects can achieve in real conditions of development (Mokiy, 2021a).

Time is not measured by hands moving on a fixed dial on a clock. Instead, in the Unicentric philosophy, time is a form through which a prospective futurity is revealed by the diversity of all possible processes and their interactions within the framework of expedient development. Time is a form of *transformation* of potency – of the organizing hidden, latent force. Time helps both functional ensembles of objects (to be discussed) and objects to coordinate meanings, synchronize results, and achieve goals, so transformation can occur. Time arises at the moment the initial potency (idea) is activated and unfolds as a form of transformation of that potency. Figuratively speaking, time demonstrates the duration of the slide show of purposefully transforming potency (Mokiy, 2021b).

To summarize, as forms of a prospective futurity, space, information, and time are three facets of the General order, which determines the unity of a purposefully developing world at all levels of reality. Space (*existence* of potency) determines what can

manifest (information) through what *transformation* (time). While information helps potency manifest from Nothing, time helps potency transform. Within the Unicentric philosophy, "the structure of fragments of space, the attributes of information, and the periods of time are used to describe the one and only world" (Mokiy & Lukyanova, 2022d, p. 19). When addressing wicked, multifactorial problems, people can use the General order as "a prism to simultaneously see the frozen image of ancient history, the disturbing present and the promising future" (Mokiy & Lukyanova, 2022b, p. 22) – the *prospective futurity* of the One and Only World.

Systems transdisciplinarity further assumes that potency can be transferred from philosophical categories to methodological categories. Potency thus has four additional properties (abilities). *Function* is the ability to embody certain processes. *Energy* is the ability to perform certain actions in certain processes. *Development* is the ability to transform itself in certain processes. And *goals* are the ability to achieve certain results in the process of its transformation (Mokiy, 2009). In effect, these abilities contribute to researchers realizing the promise of futurity by studying fragments of the One.

Unification, Generalization, and Functional Ensembles

Systems transdisciplinarity represents an object as an original functional ensemble (to be discussed) but studies it as a transdisciplinary system (Mokiy & Lukyanova, 2022d). Unicentrism thus respects and measures similarities (isomorphisms) between the structure and properties of *systems* (i.e., the isomorphism of the General order) (Blackburn, 2016). The Russian school of transdisciplinarity is predicated on the similarity (isomorphy) of laws in different fields of study. Its intent is to help people to broaden their scientific worldview horizon so a fuller picture of the One and Only World can emerge through the unification *and* generalization of disciplinary knowledge made possible by training people in a systems transdisciplinarity mindset (ITT, 2023c; Mokiy, 2022).

Unification and Generalization
To explain further, each discipline has a systematized body of knowledge. Unlike other approaches to transdisciplinarity, which strive to amplify the *synthesis* and *integration* of this knowledge (often with societal knowledge) into a new whole (*holism*), the Russian school strives to amplify the *unification* and *generalization* of disciplinary knowledge and scientific worldviews in the spirit of *Unicentrism* (Mokiy & Lukyanova, 2022d). They shared the following clarification:

Unification describes the process of bringing disciplinary knowledge classifications of different disciplines into a single systems transdisciplinary classification. Once unified, disciplinary knowledge emerges as an active participant in the systems transdisciplinary solution of today's wicked problems. Generalization provides a method to orderly fill a systems transdisciplinary model of order units with necessary and sufficient disciplinary knowledge that accurately describes the objective essence of the object or problem (Mokiy & Lukyanova, 2022d, p. 153).

Said another way, when conducting a systems transdisciplinarity research project, researchers would bring knowledge from different disciplines together through *unification* (i.e., by creating new systems transdisciplinarity *classifications*). After unification, the next step is *generalization,* which entails explaining how this knowledge relates to each other (due to isomorphisms) to better explain the essence of the One World. As a caveat, unification and generalization do not negate disciplinary knowledge bases because they are needed to help create systems transdisciplinarity knowledge. Instead, the researcher "initially discovers ... existing inner connections, which determine objects as a [transdisciplinary] system. Later, [the researcher] coordinates individual ... attributes of objects into an undividable whole. ... As a result, knowledge about the objects becomes more ... complete" (Mokiy, 2019b, p. 64).

To elaborate, systems transdisciplinarity assumes that "complete information is impossible without knowledge of existing scientific disciplines [which is then] subject to unification and generalization within the framework of the corresponding systems transdisciplinary models of units of order. If these [fragments] are fully described with the help of disciplinary knowledge, then [systems transdisciplinarity] knowledge can be considered complete" (Vladimir Mokiy, personal communication, September 30, 2023; Mokiy, 2020a).

Ludwig von Bertalanffy's idea that similarities (isomorphisms) thread their way through all disciplines, despite each discipline's uniqueness, inspired systems transdisciplinarity proponents' conceptualization of unification and generalization (Mokiy & Lukyanova, 2022d). Citing von Bertalanffy (who developed general system theory in the sixties), Mokiy (2020b) explained that "a unitary conception of the world [assumes] the world, i.e., the total observable events, shows structural uniformities, manifesting themselves by isomorphic [similar] traces of order in the different levels or realms" (para. 11). In other words, the generality of the world (i.e., *General* order) is evident in each unique fragment comprising that world (units of order). People study the latter to learn more about the former thereby building a richer, more complete portrait and story of the One and Only World (Mokiy, 2020b).

In short, unification and generalization are two interrelated terms, which form the basis of the systems transdisciplinarity approach. Unification is the process of bringing knowledge of complementary and noncomplementary disciplines and/or their disciplinary classifications to a uniform systems transdisciplinarity *classification*. This involves structuring disciplinary knowledge according to essential information features (isomorphisms). Generalization is a way of realizing the objective *essence* of a research object being studied and is dependent on the ability of the unified knowledge and new classifications to perform descriptive and predictive *functions*.

Systems transdisciplinarity proponents maintained that contemporary society was changing and trans-forming. People need a way to address and maybe solve complicated multifactorial (wicked) problems in circumstances when mono, multi, and interdisciplinarity

were ineffective. Russian school proponents were convinced that the best way to approach the notion of General order was to combine systems theory with transdisciplinarity to create a new academic discipline. "In our opinion, among many types of thinking and worldviews, systems thinking and transdisciplinarity have the highest theoretical and practical significance in solving complicated high-threshold problems" (Mokiy & Lukyanova, 2022b, p. 21).

Functional Ensembles

What might this problem solving look like? Employing their notion of *functional ensembles* (i.e., a group of things viewed and performing as a whole) helps answer this query. To illustrate, human species, plants, and animals are examples of *horizontal functional ensembles*. Each species is a community or group of organisms that originates from a common ancestor. In contrast, Planet Earth is a *vertical functional ensemble* comprising a General order that permeates the internal unity of each participant in the ensemble (Mokiy & Lukyanova, 2019). The intent of systems transdisciplinarity is to isolate a complex problem within these functional ensembles and use the universal (applicable to all cases) systems transdisciplinary methodology (focused on the One as revealed through its fragments) to research and solve or at least address the problem (Mokiy & Lukyanova, 2022d).

As an example of this problem solving and *rethinking* in action, researchers concerned with sustainable development would assume that a General order permeates everything in the universe. To ensure that Planetary Earth (a vertical functional ensemble) can continue to exist and evolve (i.e., sustainable development), researchers would assume that humankind's role (one of many horizontal functional ensembles) is to transform planetary matter in accordance with the General order that determines the unity of the Universe. This human responsibility demands a deep respect for sustainability, resilience, and complexity (Mokiy & Lukyanova, 2022e).

Evidence That Systems Transdisciplinarity Is a Discipline

Architects of the Russian school of transdisciplinarity framed systems transdisciplinarity as a new academic metadiscipline purposefully intended to be integrated into any university's organizational structure as a separate, standalone department or faculty that trains students in the systems transdisciplinarity worldview and mindset (Mokiy & Lukyanova, 2022b, 2022e). Graduates would be *speciality systems transdisciplinarity generalists* who hold a systems transdisciplinary worldview, which is much broader than any one discipline's scientific worldview (Mokiy, 2022).

At my behest, Dr. Vladimir Mokiy answered a roster of questions I had prepared pursuant to how he thought systems transdisciplinarity meets the six main criteria of an academic discipline (see Kim, 2018; Kirshnan, 2009). As a caveat, Dr. Mokiy's direct responses are woven into the following text with "quotation marks" but without repeating the conventional reporting format for personal communications (which occurred September 30, 2023).

Research Object

First, any discipline has a particular object of research that is not necessarily shared by other disciplines (Kirshnan, 2009). The object of research in the systems transdisciplinarity discipline is the "General order that determines the unity of material objects, the environment, as well as the processes of their interaction at all levels of reality." Researchers trained within this discipline are taught that "the objects that form the basis of the material world are considered ... participants in certain horizontal and vertical functional ensembles of the planet Earth. Each functional ensemble, each member of a functional ensemble, their relationships, connections and interactions ... is an element of a One Orderly Medium. [This discipline] studies an object as a system [by applying] systems transdisciplinary models of spatial, informational, and temporal units of order [as uniquely understood within the Unicentric philosophy]."

Body of Knowledge

Second, every legitimate discipline has an accumulated body of knowledge that refers to the object of research (Kirshnan, 2009). For systems transdisciplinarity, this nascent but intensively comprehensive body of knowledge concerns "the types and forms of manifestation of the General order in its own space, time and information of material objects, the environment and their interactions at all levels of reality." Many articles have been published in Russian (including a textbook; Mokiy and Lukyanova, 2021) with a growing English-language presence since 2019 (ITT, 2023a). The latter appear in nearly 10 different refereed journals and as book chapters, and conference proceedings (Mokiy, 2024).

Theories, Concepts, and Constructs

Third, disciplines have their own theories, concepts (directly observable, e.g., a person), and constructs (higher level of abstraction not readily observable, e.g., leadership) that can effectively be used to organize the accumulated body of knowledge (Kirshnan, 2009; McGregor, 2018). In Mokiy's opinion, systems transdisciplinarity is a meta-discipline with its own meta-theory and meta-narrative. Furthermore, it has a unique philosophical basis (Unicentrism) and the overarching potency construct. Together, the meta-theory, meta-narrative, and Unicentric philosophy "can effectively systematize the accumulated specialist knowledge." As noted, Mokiy and his colleague, Tatiana Lukyanova, have actively developed and published refereed articles about systems transdisciplinarity's theoretical and philosophical constructs (Mokiy, 2024).

Jargon and Lingo

Fourth, the systems transdisciplinarity metadiscipline meets another criterion. It uses specific terms and special technical language that are adjusted to its research object (Kirshnan, 2009) (although I continue to struggle with discerning what they may mean in actual research efforts): isomorphism, One Orderly Medium (the One and Only World), General (universal) order, units of order, potency, futurity, prospective futurity, axioms of Unicentrism, space (existence), information (manifestation), time (transformation), and vertical and horizontal functional ensembles. The Russian school has developed a glossary of terms pursuant to its transdisciplinary approach (ITT, 2023b).

Research Methodologies and Methods

Fifth, like other disciplines (Kirshnan, 2009), systems transdisciplinarity has developed specific research methodologies and methods according to its research requirements namely unification, generalization, and functional ensembles. "The methodological tool of systems transdisciplinarity is the systems transdisciplinarity approach [which] is a universal method of expanding the horizon of the scientific worldview within the framework of the philosophical picture of a One and Only World by unifying and generalizing disciplinary knowledge."

To conduct work within the systems transdisciplinarity metadiscipline, researchers are trained to *manage and coordinate the knowledge* from disciplines instead of coordinating and managing the disciplinary specialists themselves (Mokiy & Lukyanova, 2022c). This includes all forms of knowledge: "unconditional, intuitive, speculative, and empirical" (Mokiy & Lukyanova, 2022c, p. 107). In more detail, disciplinary specialists in transdisciplinary teams do not need to seek consensus and compromise. [Rather], their participation [involves performing their part of the research using respective disciplinary methods and tools]. Specialists-generalists, carriers of the methodology of systems transdisciplinary methodology, at the final stage, unify and generalize the results, form the final conclusions of the study, describe them in a language understandable to disciplinary specialists, administrative workers and politicians, and analyze the risk associated with the implementation of the results of systems transdisciplinary research (Mokiy & Lukyanova, 2022c, p. 115).

Systems transdisciplinarity generalists *unify* knowledge from various disciplines to create "a uniform systems transdisciplinary classification." This new classification is possible because each discipline contains aspects of the General order (isomorphic similarities): space (existence), information (manifestation), and time (transformation) of potency. Once unified, this new classification "becomes an active part of the systems transdisciplinary solution for wicked problems [and] complex scientific problems." After unification comes *generalization* understood to be a method for the orderly filling of units of order with necessary and sufficient disciplinary knowledge that accurately describes the objective of the Oneness of the object (Mokiy, 2019b, 2023b).

The systems transdisciplinarity methodology focuses on analyzing reality. Researchers are taught to assume that other disciplines describe reality "the way it is" as seen through their respective worldview. A systems transdisciplinary researcher's role is to study a problem by trying to determine "how reality should be" so there is *complete* information – no information imbalances or information tensions (Mokiy, 2020a). Researchers look

at the small details of the world (fragments – horizontal functional ensembles) and their interactions. In the process, they substantiate all possible horizons of each discipline's worldview and describe their general characteristics (Mokiy, 2020a).

To continue, *unifying* various disciplines' knowledge to the point that it can be *generalized* based on its isomorphies allows researchers to create new systems transdisciplinary knowledge, methods, and technologies that can restore information balance and eliminate information tension and incompleteness; that is, address the problem using more complete information gained from studying the fragments of the One. Mokiy (2020a) illustrated this methodology by applying it to the study and explanation of human diseases (Mokiy & Lukyanova, 2021, pp. 105–107).

As a caveat, "unification and generalization do not break the disciplinary classifications of knowledge and do not cancel their disciplinary criteria, indices, and parameters. [Rather] they help in interpreting the [latter] in terms of the order conditioning of a unity of the environment, as well as the objects and processes, which are its elements" (Mokiy, 2020a). "Full knowledge of a One Orderly Medium and its elements can be obtained by using models of spatial, temporal, and informational units of order in scientific research as well as interpreting function, energy, development, and purpose [i.e., potency] in their context." One such context might be unsustainable dam building in a local valley and its impact on Indigenous people and the local community.

From a methodological perspective, researchers trained in systems transdisciplinarity thus learn that "the process of cognition of the world and the use of the results of cognition of the world has two directions – ascending and descending. Both are necessary to unify and generalize disciplinary knowledge. The upward direction demonstrates overcoming the horizon of a discipline's existing worldview. This next horizon can play the role of a ceiling or a floor. When someone feels a ceiling, they become an adept of the new worldview. When they feel a floor, they feel the presence of the unknown and are ready for knowledge. Their role is to determine the significance of possible horizons of the worldview relative to the multifactorial problem being addressed."

Standalone Department or Faculty

Sixth, the last criterion characterizing a discipline is the existence of curricular content (i.e., subjects taught at universities and colleges), respective academic departments, library holdings, professional associations, a community of scholars, and refereed journals and conference venues (Kirshnan, 2009). Anticipating resistance, Mokiy clarified that an additional department housing a new academic discipline does not harm or compromise a university's existing disciplinary structure. Instead, systems transdisciplinarity (and any supportive infrastructure) "significantly enhances the practical capabilities of graduates [to address] complex, wicked problems and complex scientific problems."

To reiterate, graduates would be *speciality systems transdisciplinarity generalists* who hold a systems transdisciplinarity worldview and mindset (Mokiy, 2022). This paradoxical term means they would specialize in being generalists; that is, a person who applies their knowledge, aptitudes, and skills to a field as a whole – in this case, the new field (metadiscipline) of systems transdisciplinarity. They learn how to unify and generalize results generated by a collection of disciplines involved in a project and then form and communicate the final conclusions of the study (Mokiy, 2009, 2019b).

In my opinion, this is the least-developed criterion, but proponents are actively working on making it happen (Mokiy, 2022). Within and beyond the Russian context, collaborative work is underway to (a) implement a four-year international project focused on training university students to learn the systems transdisciplinarity worldview, (b) write a graduate-level textbook for use within the international project and (c) formulate a master's degree in systems transdisciplinarity for international use (Mokiy, 2019a, 2019b, 2022; Mokiy & Lukyanova, 2023). The thinking is that, with the political will, any university could choose to institutionalize this approach and would be more inclined to do so if an internationally approved blueprint is available: a sanctioned discipline, a university department infrastructure model, a degree program (bachelor and postgraduate), and a curriculum with supportive instructional materials and pedagogy.

Russian school proponents reasoned that a new discipline with its own department and curriculum is needed (and an international effort is warranted) because each wicked, multifactorial problem is unique. It is thus impossible and unreasonable to teach university students research methods that will fit *every* scenario. What is needed *instead* is a curriculum and course of study that enhances their intellectual activity to broaden their worldview and instill a new mindset. Systems transdisciplinarity was thus developed as a metadiscipline that teaches a universal method that expands the horizon of the scientific worldview within the Unicentric philosophical framework (Mokiy, 2022).

Summary and Conclusion

To wrap up, systems transdisciplinarity (understood to be an academic discipline – a metadiscipline) provides "opportunities to bring together all of humankind's knowledge into one integrated and consistent science, with a common set of concepts expressed as a metalanguage" (Mokiy & Lukyanova, 2019, p. 152). A *metalanguage* (language about languages) is possible because the isomorphies present in disciplines and the One and Only World can be used to convey generalized concepts and meta-models (model of models) (Arnold, 2020).

Meta-models (a) help researchers better understand the systems that other disciplines study and how; (b) facilitate justification for and collaboration within multiactor scientific research and global projects; and (c) help people gain insights into their own discipline, which can contribute to broadening disciplinary horizons. Systems transdisciplinary meta-models can also (d) help researchers recognize any mind games they are playing (pushback and resistance) and mitigate their perceived

need to psychologically protect themselves when proponents of systems transdisciplinarity challenge their scientific worldview (Arnold, 2020; Mokiy, 2020b; Mokiy & Lukyanova, 2022b).

These benefits align with how proponents and adherents to the Russian school view transdisciplinarity. The new systems transdisciplinarity metadiscipline (with its meta-models, meta-theory, meta-narrative, and meta-language) strives to maximize the extension of the scientific worldview horizon by creating a cadre of experts specially trained to address multifactorial, high-threshold problems using a combination of systems thinking and the transdisciplinary worldview informed by the Unicentric philosophy.

The Russian school believes that a new discipline that trains speciality *systems transdisciplinarity generalists* will help future researchers conduct and publish research that has immediate practical relevance (ITT, 2023a). The extent to which research has practical relevance depends on "how much the research question matters to society, and how useful the answer from the research is" (Gallien et al., 2007, p. 7). Practical relevance is also associated with the conventional understanding of (a) generalizability – "the extent to which [the research] is of interest to a large number of practitioners" and (b) validity – "the extent to which research results and prescriptions (or predictions) are well-founded and apply effectively to real-world operations" (Gallien et al., 2007, p. 7).

Systems transdisciplinarity (developed within the Russian context using a specially created Unicentric philosophy) is now available for consideration by specialists and scientists of any nationality and citizenship who view transdisciplinarity as a separate scientific discipline and an independent science. Said practitioners will be drawn to the isomorphic Unicentric philosophy, which posits that studying research objects for evidence of common threads running through everything (General order) will help paint a fuller picture of the One world and all its complexity. Using this mindset helps people to move beyond the scientific and their discipline's worldview to one that privileges unifying and generalizing disciplinary knowledge to create systems transdisciplinarity knowledge. The latter are then used to address wicked, multifactorial problems that are beyond the ken of mono, multi, and interdisciplinary knowing.

Bates (2005) asserted that most researchers have a cognitive style – a certain way of thinking that comes naturally to them. Called *orienting strategies*, these styles represent the sort of thinking that works best for them and is harmonious with how their disciplinary-trained mind works. To sway people to systems transdisciplinarity and its metatheory and metanarrative, university programs must be designed that intentionally reorient people's cognitive style, so they can move beyond their disciplinary comfort zone and limiting worldview. This is not such a big ask because "basic metatheoretical assumptions about what research is or should be are breaking down and being challenged by newer approaches" (Bates, 2005, p. 8). The systems transdisciplinarity metadiscipline is an example of a "newer approach" – a novel cognitive orientation.

A cadre of fully established departments and/or faculties entrenched globally within universities would perpetuate this new discipline and cognitive style and train future generations in this version of transdisciplinarity. The Russian school (i.e., a new academic metadiscipline) joins the esteemed company of Nicolescu's methodology, the Zurich school's pragmatic approach of doing science with society, and the Brazilian theory of transdisciplinarity (McGregor, 2023). Systems transdisciplinarity generalists – trained in specially designed university departments using specially designed higher education curricula – could be considered next-generation transdisciplinarians.

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